

Cum PTO

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1. (Amended) An information reproducing system comprising:
code reading means for reading a [desired] dot code from an
information recording medium on which multimedia information
including at least any one of audio information, image
information and digital code data has been recorded in the form
of a dot code which can optically be read, to provide an image
signal corresponding to an image formed from said dot code that
has been read;

binarizing means for generating binarized data from [an]
said image signal [corresponding to the dot code read by said
code reading means]; and

information reproducing means for restoring said binarized
data generated by said binarizing means to [original] the
multimedia information [to reproduce] and for reproducing the
multimedia information, wherein

said binarizing means includes:

reference dot detection means [which binarizes the image
signal with a predetermined threshold value prior to generating
binarized data so as to detect] for detecting a reference dot
from [the] said binarized [code image] data by use of a
predetermined threshold value;

dot area measuring means for measuring [the] an area of the
reference dot detected by said reference dot detection means; and

threshold value modifying means for [modifying the]
obtaining a modified threshold value derived in such a manner
that the area measured by said dot area measuring means
approaches a predetermined target value[;and],

[threshold value determining means for binarizing the image
signal with the threshold value modified by said threshold value
modifying means.]

wherein said binarizing means generates said binarized data
from said image signal based on said modified threshold value.

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2. (Amended) An information reproducing system according to claim 1, wherein said binarizing means binarizes the image signal formed from said dot code that has been read by said code reading means in [one of field and frame] units of one field or units of one frame.

3. (Amended) An information reproducing system according to claim 1, wherein

said code reading means successively reads [the code image] said dot code, and

said binarizing means [modifies the threshold value of the successive image signals read by said reading means in one of the previous field and previous frame in accordance with the area of the detected reference dot so as to binarize the one of the present field and present frame with] detects, with said reference dot detection means, the reference dot from binarized data generated from a particular image signal corresponding to an image formed from said dot code of an immediately preceding field or frame, said particular image signal having been binarized based on said predetermined threshold value, and wherein said binarizing means further measures the area of said reference dot to obtain an area measurement, modifies the predetermined threshold value, with said threshold value modifying means, based on said area measurement, to derive said modified threshold value, and binarizes a current field or frame based on the modified threshold value.

4. (Original)

An information reproducing system according to claim 1, wherein the reference dot is one of a data dot and an insulated dot having substantially the same size and same shape as those of the data dot.

5. (Amended) An information reproducing system according to claim 1, wherein the dot code recorded on said information recording medium includes a data code corresponding to the multimedia information and a pattern code for determining the position at which the data code is read, and the reference dot is at least a portion of the pattern code.

6. (Original)

An information reproducing system according to claim 5, wherein
said dot area measuring means includes:
dot interval measuring means for measuring the distance between predetermined dots forming the pattern code; and
area correction means for correcting the area of the reference dot or the target value in accordance with the interval between dots measured by said dot interval measuring means.

7. (Amended) An information reproducing system according to claim 1, wherein
said reference dot detection means detects a plurality of said reference dots; and

said dot area measuring means has average area calculating means for calculating [the] an average area from areas of the detected [plural] plurality of said reference dots.

8. (Amended) An information reproducing system according to claim 7, wherein

said dot area measuring means has dot selection means for inhibiting input of the area of the reference dot into said average area calculating means in a case where the measured area of each reference dot is [larger than] outside of a predetermined range.

9. (Amended) An information reproducing system according to claim 1, wherein

said threshold value modifying means has threshold value holding means for (i) counting the number of reference dots detected by said reference dot detection means, (determines) (ii) determining whether or not the counted number of the reference dots satisfies a predetermined number and (inhibits) (iii) inhibiting modification of the threshold value in a case where the counted number of reference dots is less than the predetermined number.

10. (Amended) An information reproducing system according to claim 1, wherein

said threshold value modifying means includes;

peak value detection means for detecting [the] a maximum value and [the] a minimum value of [the] a luminance from a [predetermined] detection region defined on the image formed from the dot code read by said code reading means;

interior division ratio modifying means for modifying [the] an interior division ratio in accordance with [the] an amount of modification of the interior division ratio calculated from [the] a difference between the area measured by said dot area measuring means and the predetermined target value; and

threshold value calculating means [which divides the value] for multiplying a difference between the maximum and minimum values detected by said peak value detection means with the interior division ratio modified by said interior division ratio modifying means and adding the minimum value so as to [calculate the] obtain said modified threshold value.

11. (Amended) An information reproducing system according to claim 10, wherein said peak value detection means [interrupts following processes for] terminates subsequent processing of the image signal for a [subject] current frame in one of a case where the detected minimum value is larger than a predetermined first threshold value and a case where the detected maximum value is smaller than a predetermined second threshold value.

12. (Amended) An information reproducing system according to claim 10, wherein said peak value detection means has selective average calculating means for calculating [the] an absolute value of [the] a difference between luminance values of pixels that are positioned adjacent to a pixel of interest and for calculating [the] an average value of the luminance values of adjacent pixels only when [a result of the calculation] said absolute value is smaller than a predetermined threshold value [so that], wherein said peak value detection means thereby detects the peak values [are detected] from the calculated average value of the [calculated] luminance values.

13. (Amended) An information reproducing system according to claim 10, wherein said interior division ratio modifying means has an interior division ratio modification amount table for determining [the] an amount of modification of the interior division ratio in accordance with [the] a relationship between dot area S and target value S_t [so as to determine] and determines an amount Δk of modification of the interior division ratio from the measured dot area and the predetermined target value in accordance with said interior division ratio modification amount table.

14. (Original)

An information reproducing system according to claim 10, wherein said interior division ratio modifying means calculates the amount Δk of modification of the interior division ratio by using a predetermined coefficient α , the dot area S and the target value S_0 , in accordance with the following equation:

$$\Delta k = dS - S_0$$

15. (Original)

An information reproducing system according to claim 14, wherein the predetermined coefficient α is made to be one of the same and smaller whenever modification is repeated.

16. (Amended) An information reproducing system according to claim 10, wherein said interior division ratio modifying means changes the interior division ratio in a stepped manner and [provides] allows an interior division ratio modifying operation to have a hysteresis characteristic.

17. (Original)

An information reproducing system according to claim 10, wherein said interior division ratio modifying means has interior division ratio limit means which determines whether or not the modified interior division ratio is in a predetermined range to clip the interior division ratio in a case where the interior division ratio is out of the predetermined range.

18. (Original)

An information reproducing system according to claim 10, wherein
 said reference dot detection means detects a plurality of reference dots, and
 said interior division ratio modifying means has interior division ratio holding means for counting the number of the detected reference dots, for determining whether or not the counted number satisfies a predetermined number and for inhibiting modification of the interior division ratio in a case where the counted number does not satisfy the predetermined number.

19. (Amended) An information reproducing system according to claim 10, wherein

said code reading means successively reads [the code images] said dot code,

said interior division ratio modifying means modifies the interior division ratio to one of a field and a frame which satisfies a predetermined condition for the successive image signals formed from said dot code read by said code reading means and holds the modified interior division ratio for one of the following field and frame.

20. (Amended) An information reproducing system according to claim 1, wherein

the dot code recorded on said information recording medium has an attitude dot disposed in a predetermined [region] area adjacent to [the] a reading start end and including information about said information recording medium for determining the threshold value required by said binarizing means, and

said binarizing means includes:

attitude dot detection means for detecting the attitude dot;

attitude reading means [which binarizes the image signals read by said reading means in one of field and frame units so as to read] for reading information relating said information recording medium from the attitude dot [of said binarized image] detected by said attitude dot detection means in the image signal formed from the dot code read by said code reading means and binarized based on the threshold value determined in accordance with said attitude dot; and

attitude storage means for storing information read by said attitude reading means and applying information to each of following images.

21. (Canceled)

22. (Canceled)

23. (Amended) An information recording medium [according to claim 21,] for use in an information reproducing system having code reading means for reading a dot code from an information recording medium on which multimedia information including at least any one of audio information, image information and digital code data has been recorded in the form of a dot code which can optically be read; binarizing means for generating binarized data, by use of a predetermined threshold value, from an image signal corresponding to an image of the dot code read by said code reading means; and information reproducing means for restoring the binarized data generated by said binarizing means to the multimedia information and for reproducing the multimedia information, said information recording medium comprising:

data dots which correspond to contents of multimedia information and which can optically be read; and

a reference dot arranged for use by said binarizing means when said binarizing means binarizes the image signal and modifies the predetermined threshold value so that an area of the reference dot in the image of the dot code read by said code reading means approaches a predetermined target value, said reference dot being at least part of a pattern code for use in determining positions for reading the data dots;

wherein said information recording medium has dot interval measuring dots for measuring a dot interval for correcting at least one of the area of the reference dot detected by said binarizing means and the predetermined target value.

24. (Amended) An information recording apparatus for recording multimedia information including at least any one of audio information, image information and digital code data in the form of a dot code which can optically be read, comprising:

input means for inputting information relating to said information recording medium;

storage means for storing [the] a predetermined relationship between the information relating to [a predetermined] the information recording medium and one of [the] an area of the dot [when data is recorded] and [the] a recording density when data is recorded; and

recording means for reading a corresponding one of the dot area and the recording density from said storage means in accordance with the information that relates to said information recording medium and which has been input by said input means [and relating to said information recording medium so as] to thereby record a dot code corresponding to multimedia information in accordance with the one of the dot area and the recording density.

25. (New) An information reproducing system according to claim 1, wherein

said code reading means successively reads said dot code,
and

said binarizing means detects, with said reference dot detection means, the reference dot from binarized data generated from a particular image signal corresponding to an image formed from said dot code of a current field or frame, said particular image signal having been binarized based on said predetermined threshold value, and wherein said binarizing means further measures the area of said reference dot to obtain an area measurement, modifies the predetermined threshold value, with said threshold value modifying means, based on said area measurement, to derive said modified threshold value, and binarizes the current field or frame based on the modified threshold value.

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)